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ECE 637
Exam #1

3

3.1) $s(m,n) = g(mT, nT) \quad ; \quad T > 0$

3.2) $G(u,v) = CSFT(g(x,y))$

$$S(e^{j\mu}, e^{j\nu}) = \frac{1}{T^2} \sum_{k=-\infty}^{\infty} \sum_{l=-\infty}^{\infty} G\left(\frac{\mu - 2\pi k}{2\pi T}, \frac{\nu - 2\pi l}{2\pi T} \right)$$

3.3) $\tilde{s}(m,n) = h(m,n) * s(m,n)$

$$\tilde{S}(e^{j\mu}, e^{j\nu}) = H(e^{j\mu}, e^{j\nu}) S(e^{j\mu}, e^{j\nu})$$

$$= H(e^{j\mu}, e^{j\nu}) \left[\frac{1}{T^2} \sum_{k=-\infty}^{\infty} \sum_{l=-\infty}^{\infty} G\left(\frac{\mu - 2\pi k}{2\pi T}, \frac{\nu - 2\pi l}{2\pi T} \right) \right]$$

3.4) Let $p(x,y)$ be the point spread function (PSF) of the LCD display

$$P(u,v) = CSFT(p(x,y))$$

$$F(u,v) = P(u,v) \tilde{S}(e^{j\mu}, e^{j\nu})$$

3.5) $F(u,v) = P(u,v) \tilde{S}(e^{j\mu}, e^{j\nu})$

$$= P(u,v) H(e^{j\mu}, e^{j\nu}) \left[\frac{1}{T^2} \sum_{k=-\infty}^{\infty} \sum_{l=-\infty}^{\infty} G\left(\frac{\mu - 2\pi k}{2\pi T}, \frac{\nu - 2\pi l}{2\pi T} \right) \right]$$

3.6) Select $H(e^{j\mu}, e^{j\nu})$ to be a partial or complete high pass filter so that the blurriness introduced from the sampling and reconstruction is removed